

Headquarters U.S. Air Force

Integrity - Service - Excellence

Optimization



U.S. AIR FORCE

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Overview

- **What and when to optimize**
- **Air Force remedial process optimization program (RPO)**
- **Remediation goals evaluation**
- **Process performance evaluation**
- **Monitoring program evaluation**
- **RPO resources**



Questions Addressed by Optimization

- **Is the remedial action effective and efficient?**
- **Are the remedial goals still appropriate?**
- **Is the remediation on track toward site closure or property transfer?**
- **Have the remediation objectives been met?**
- **Is it time to change or shut down a remedy?**
- **How much monitoring is needed?**
- **How can operating costs or LTM be reduced?**



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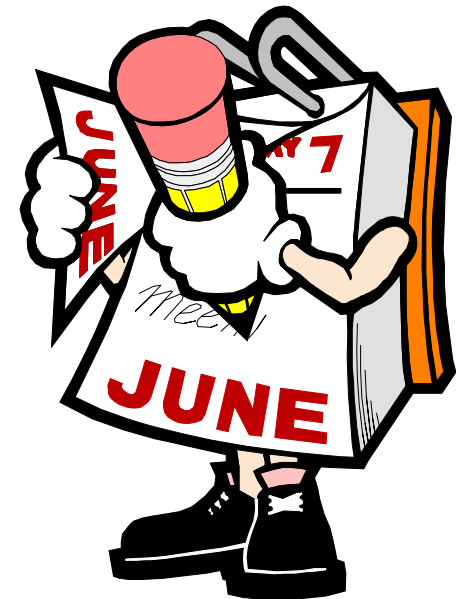
Which Sites or Systems to Optimize

- Any site that is not meeting permitted limits
- Sites where regulatory options have changed
- Sites with large operating or monitoring costs
- BRAC sites preparing for an Operating Properly and Successfully (OPS) demonstration
- Sites coming due for a regulatory review (e.g., a 5-year ROD review, a RCRA permit renewal)

When to Optimize

- Optimize after 4 to 6 rounds of operating data are available (1-2 years minimum)
- Optimize at least a year before a regulatory or OPS review is due
- Annual review by base personnel

Note: This is a continuing process!





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Remedial Process Optimization (RPO)

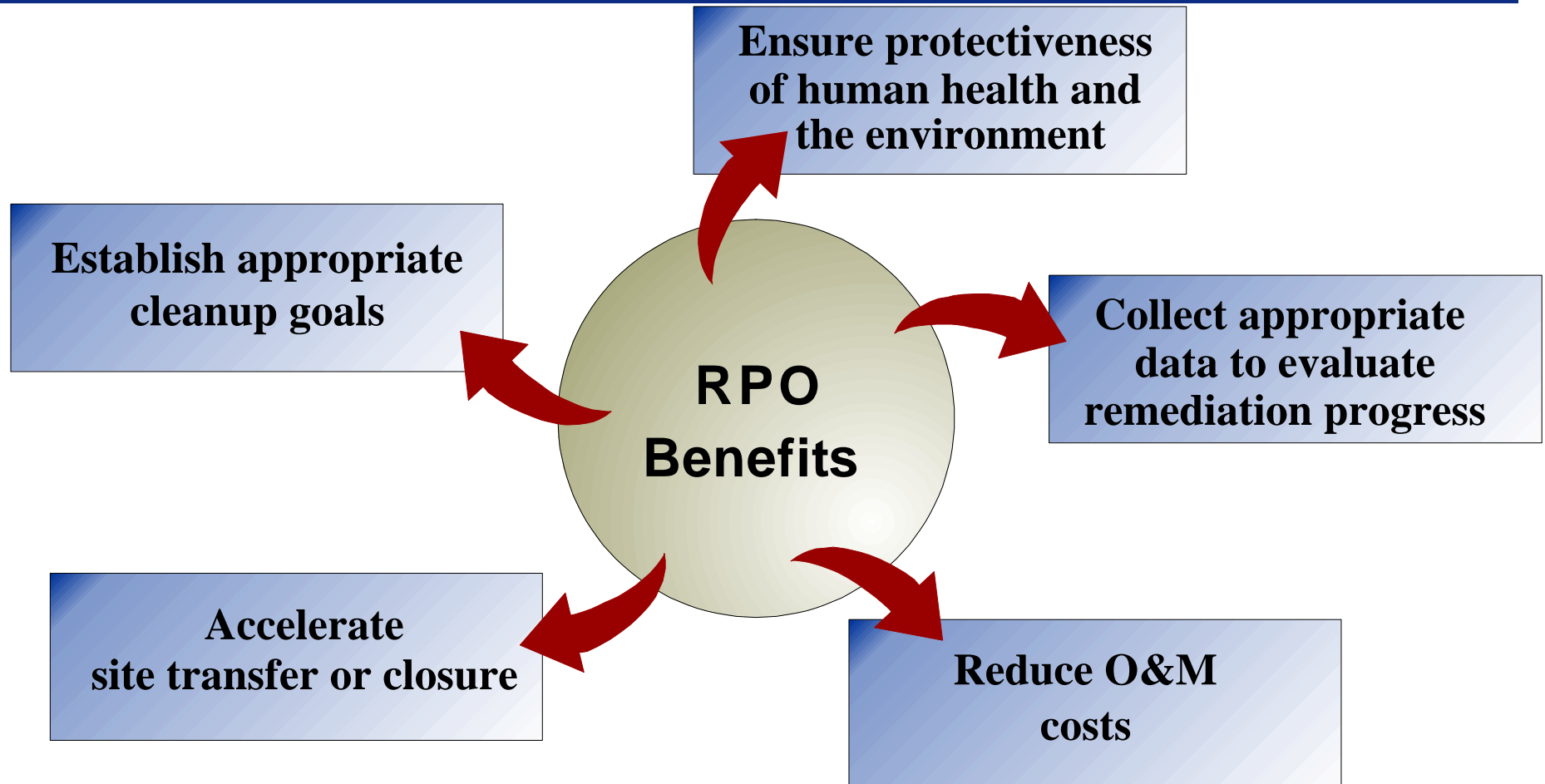
- **Systematic Planning:** An iterative evaluation to provide technical feedback and update the decision process to promote:
 - **Effectiveness**—Ensure that goals are developed, updated, and met
 - **Efficiency**—Optimize remediation and monitoring

Verify effectiveness, then consider efficiency



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Benefits of RPO



RISK PROTECTIVE - COST EFFECTIVE - SITE CLOSEOUT



Emphasis is on Effective Cleanup

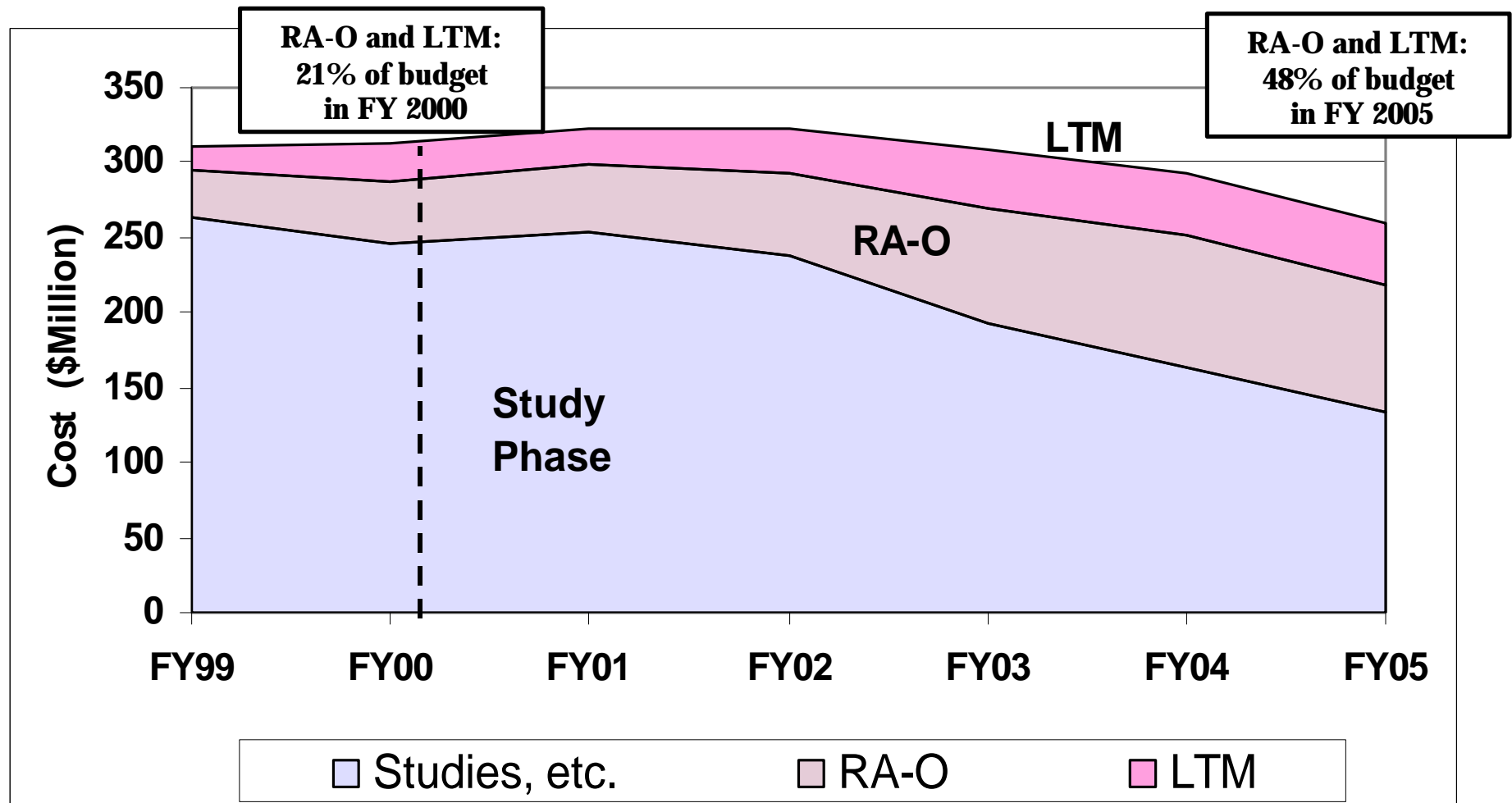
Better remediation, more protective of human health and the environment

Faster remediation resulting in quicker site closure or property transfer

Cheaper operation to maximize the cleanup results for each dollar spent

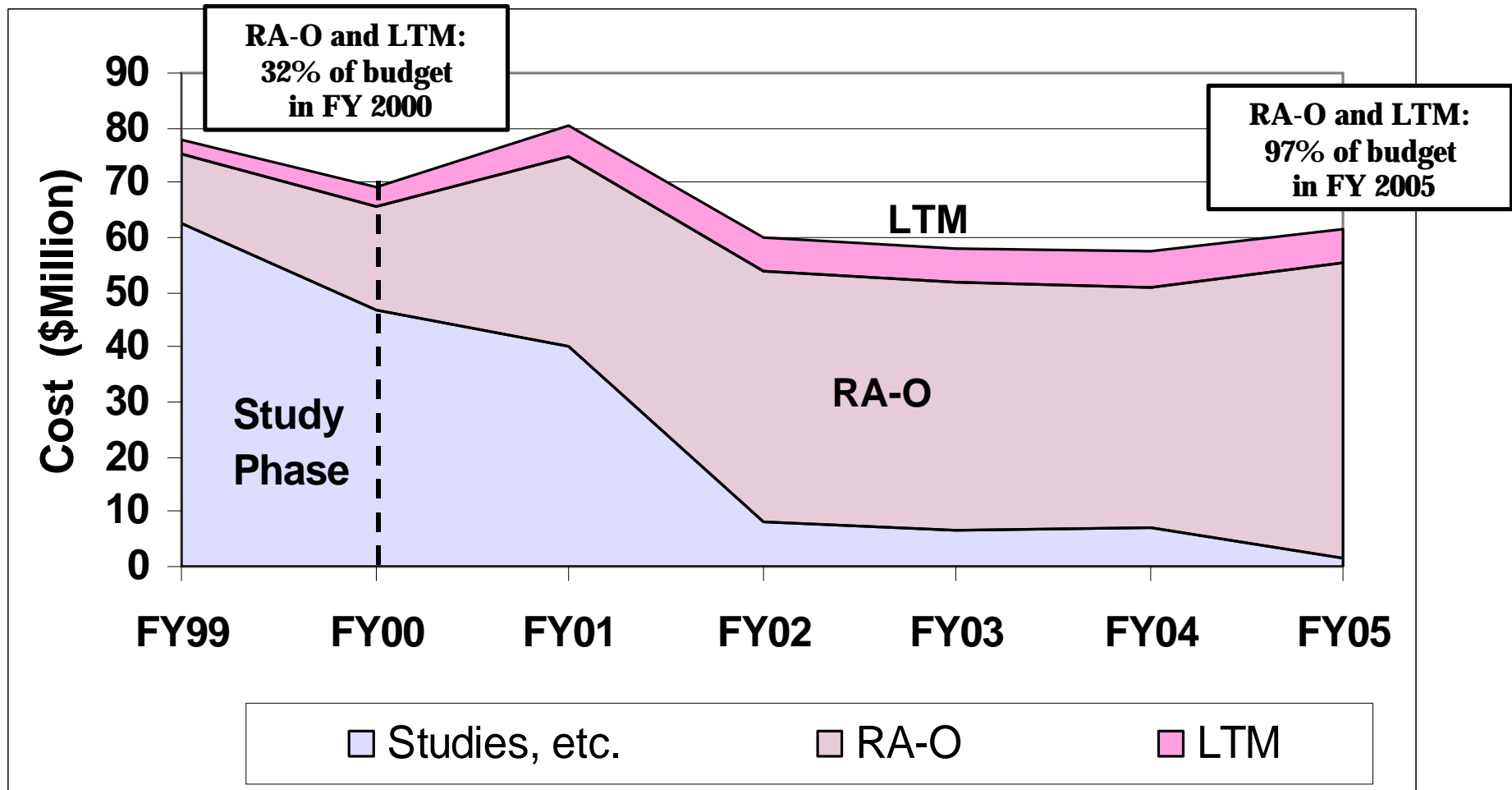
Cleanup over time

Active AF Sites



FY 2001 President's Budget IRP Program AF ERA Restoration Budget w/o Mgmt & Support Costs

Cleanup over time BRAC AF Sites



FY 2001 President's Budget IRP Program AF BRAC Restoration Budget w/o Mgmt & Support Costs



Phase 1: The Remedial Site Visit

- **Basewide review to identify RPO opportunities (provide project peer review)**
- **Focus on sites with ongoing Remedial Action Operation, Maintenance, or Monitoring**
- **Identify opportunities to implement the RPO strategies**



Phase 2: Detailed Evaluation

- **Perform a detailed evaluation of the recommendations from the Phase I RSV**
- **Evaluation should be performed by a third party—rather than the contractor responsible for O&M and LTM—to avoid any conflict of interest**



Triggers for a Phase 2 RPO

The following conditions indicate the need for a Phase II RPO:

- **A trend of increasing contaminant concentrations**
- **Lack of contaminant containment**
- **Significant reduction in mass removal rates**
- **Asymptotic concentration levels above cleanup goals**
- **Violation of discharge limitations**
- **“Excessive” O&M or monitoring costs**
- **Inappropriate cleanup goals**
- **Changes in regulations**



Phase 3: Implementation

- **Implementation of selected recommendations from the Phase 2 detailed evaluation**
- **These recommendations are implemented at the discretion of the base or facility**



RPO Component Strategies

- **Evaluate the accuracy of the CSM, as well as the appropriateness of the cleanup goals**
- **Assess the potential for the remedial design and/or remedial action to meet cleanup goals**
- **Document the decision rules to meet contingencies related to cleanup goals, technology selection, well abandonment, and performance evaluation**



RPO Component Strategies (Concluded)

- **Optimize performance monitoring of Remedial Action Operations (RA-O) and/or Long-Term Monitoring (LTM)**
- **Verify that field analytical procedures meet the DQOs**
- **Streamline and standardize data management**



The Psychology of a Cooperative Effort

- **The RSV Team must communicate:**
 - **The purpose of RPO**
 - **What the RSV is and is not**
 - **RSV Team *is* there to help look for improvement opportunities**
 - **The RSV *is not* an audit and is not there to find fault**



Where are the RPO Opportunities?

- **Conditions may have changed since the system was installed**
 - **The remedial systems have been in operation and providing additional data about the site**
 - **New remediation technologies may be available that could improve the cleanup**
 - **The regulations may have changed in the interim**

Typical RPO Cost

- **Phase I: Remedial Site Visit**
 - **Typical Cost = \$25K–\$30K**

- **Phase II: Detailed Evaluation**
 - **Typical Cost = \$200K–\$250K**



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Remediation Goals Evaluation

- **Inappropriate goals:** Consider whether the existing cleanup goals are based on risk and are appropriate for the site conditions
- **Changing regulations:** Consider whether the regulations have changed since the system was installed
- **Additional data:** The data collected over time may demonstrate the true feasibility of the existing remediation and might form the basis for requesting a regulatory change



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Process Performance Evaluation

- **Reevaluate remediation system selection and design using present knowledge of the site (contaminant concentrations, groundwater flow, etc.)**
 - **Actual performance data collected over time will aid in evaluating the process performance**
 - **New remediation technologies may be available since the system was installed**
 - **Remediation system optimization may result in improved treatment performance and cost savings**



Process Performance Evaluation (Concluded)

- Performance review checklists (jointly developed by the Tri-Services) that are available for many commonly used remediation technologies may aid in performing a detailed evaluation
- Copies of the checklists are available from the U.S. Army Corps of Engineer's web site at

www.environmental.usace.army.mil/library/guide/rsechk/rsechk.html



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Data Sufficiency and Completeness

- **Excessive or redundant data wastes funds and ecological resources**
- **Collect only sufficient data to make the decision**





Monitoring Program Evaluation

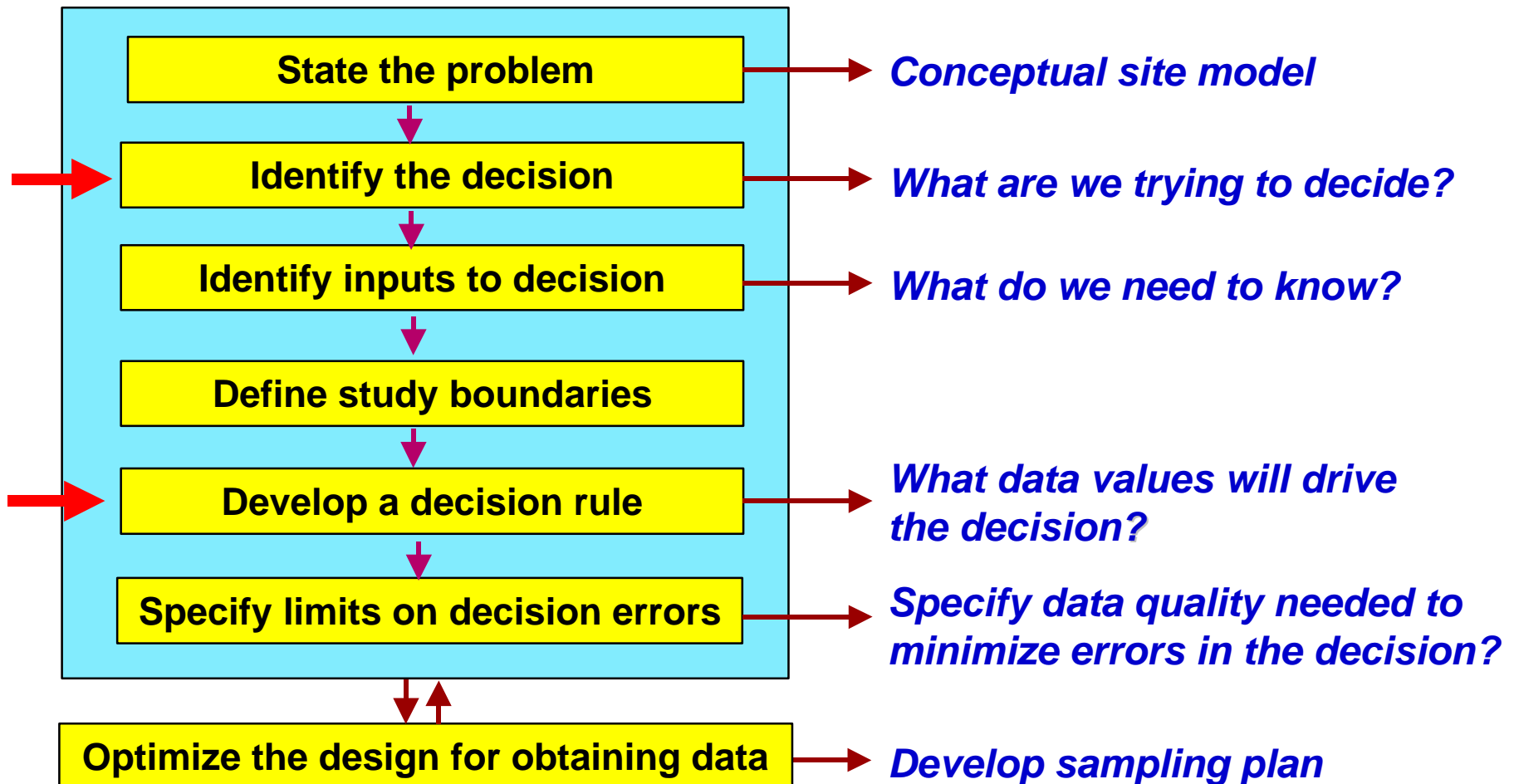
- **Optimization of the monitoring program includes a review of the following components:**
 - **Data quality objectives (DQOs)**
 - **The number and locations of monitoring wells**
 - **The sampling frequency**
 - **The analytes and protocols selected**



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Data Quality Objectives

Focus on the decision – not on the sampling plan!

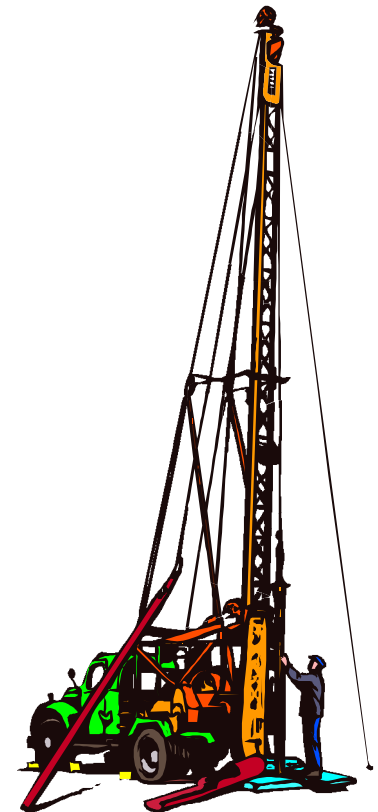


Monitoring Locations

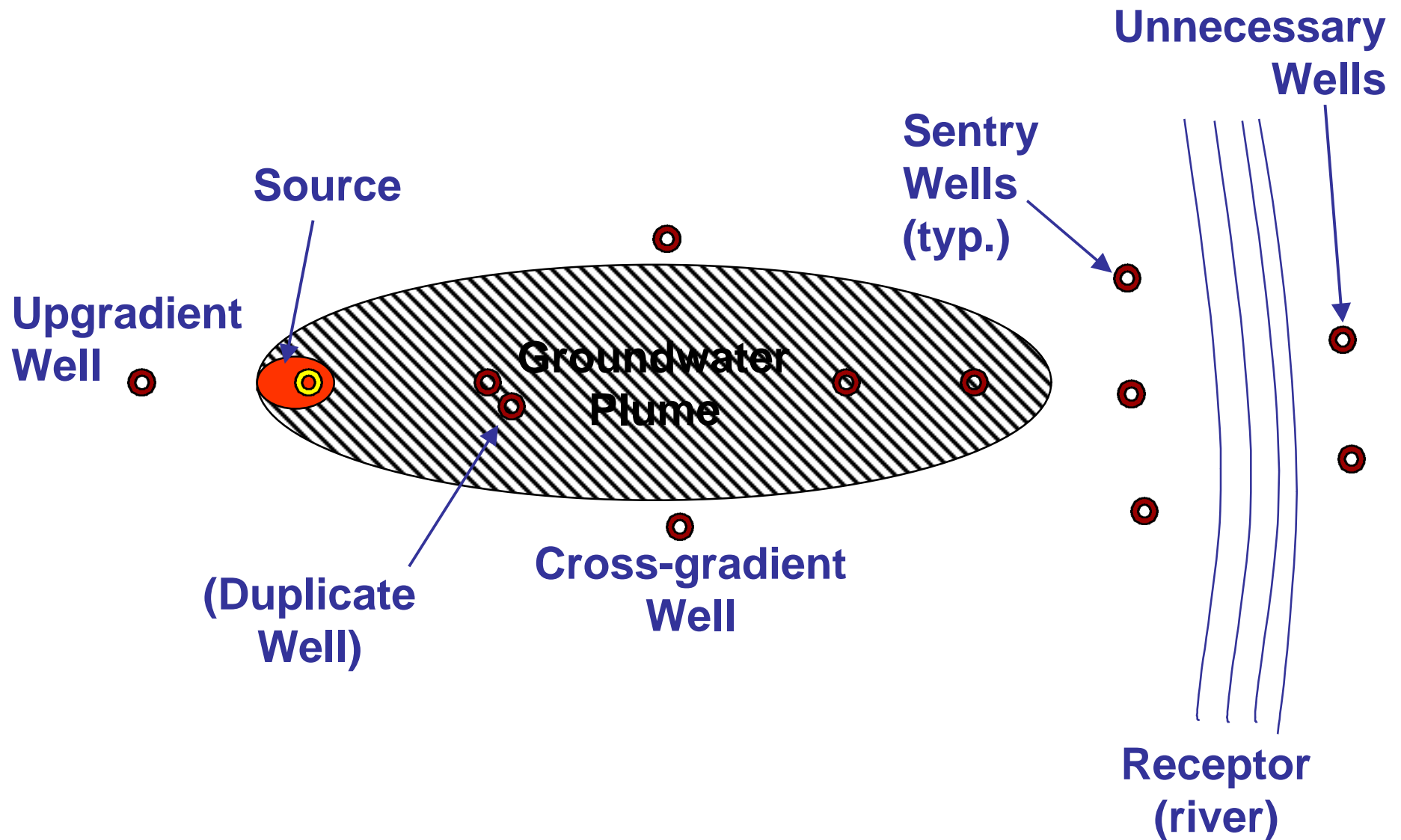
- Too many sampling locations is a problem throughout DoD
 - Difficult to focus on the remediation under a “blizzard” of data
 - Resources wasted on unnecessary sampling and analysis
 - Data storage and retrieval made more difficult
- ➔ **Need the right data from the significant pathways**

Effective Monitoring Locations

- **Eliminate sampling from wells that contribute little to our knowledge of the site**
 - **Duplicate (redundant) wells**
 - **Unnecessary sampling locations**
 - **Wells providing unreliable data**



Strategic Monitoring Locations



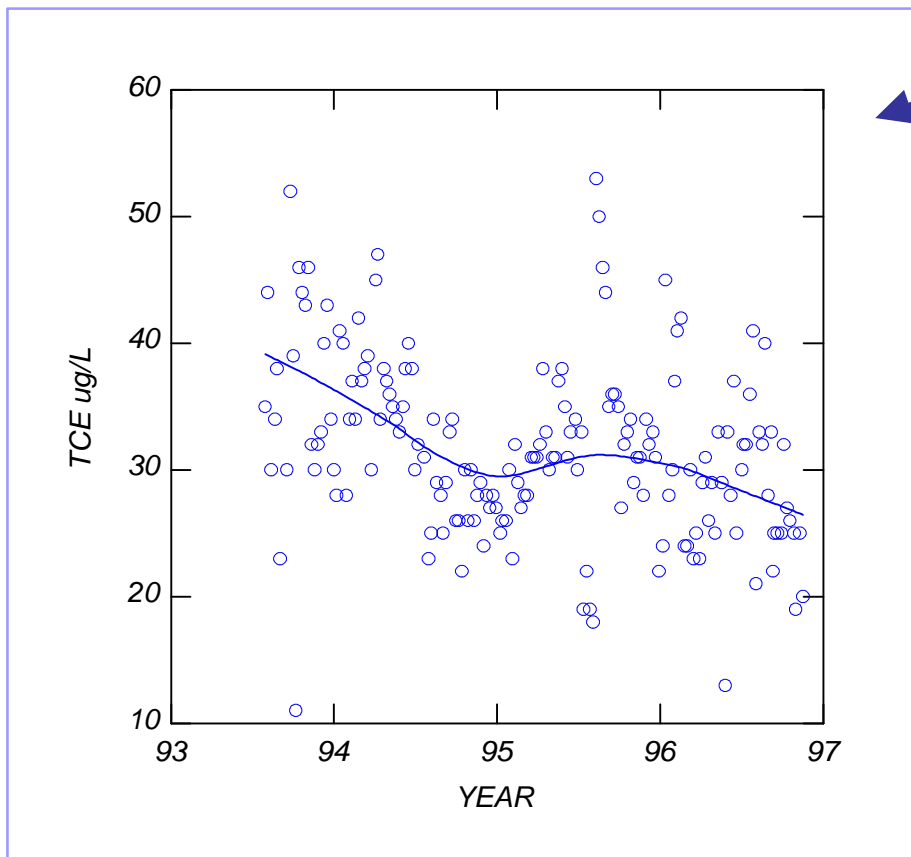
Eliminating Wells

- **Options for redundant or unnecessary wells**
 - **Do nothing (continue collecting unneeded data)**
 - **Eliminate the well (abandonment costs)**
 - **Eliminate sampling (save analytical costs)**

Reducing Sampling Frequency

Example: Smoothed Time Series Data

Influent Concentrations - Weekly Data
Pump & Treat Systems



Hunter, 1999

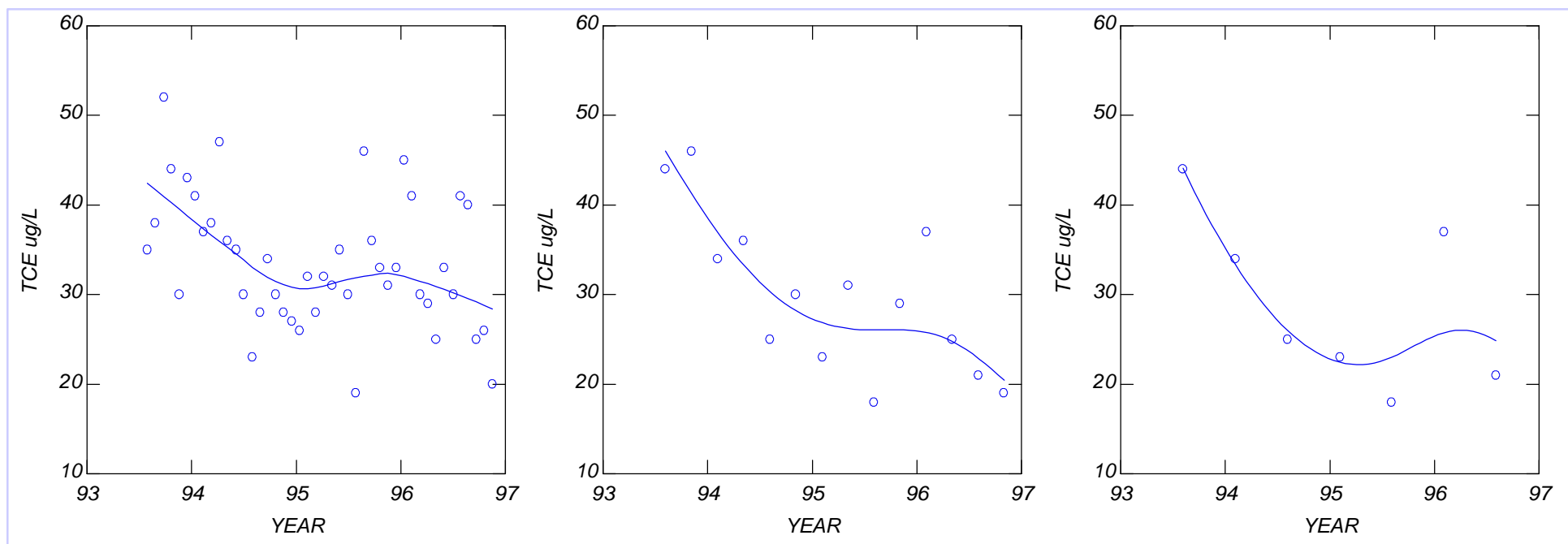
Reducing Sampling Frequency (Continued)

Reduce sampling frequency without significant loss of information

**Monthly
77% Reduction**

**Quarterly
92% Reduction**

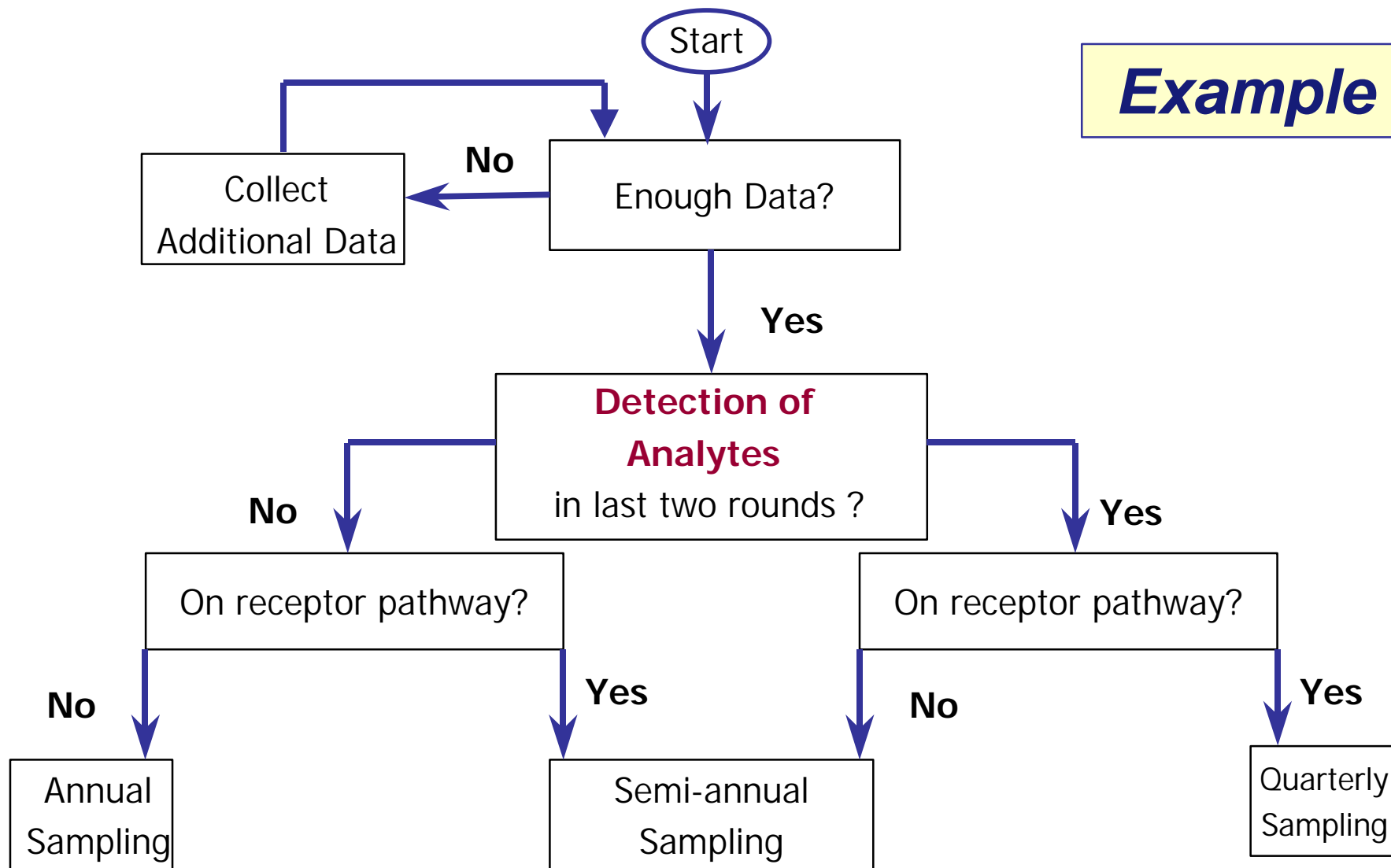
**Semiannual
96% Reduction**



Hunter, 1999

Sampling Frequency Decision Tree

Example



AFCEE Sampling Frequency Decision Tree

(from AFCEE Long-Term Monitoring Optimization Guide)

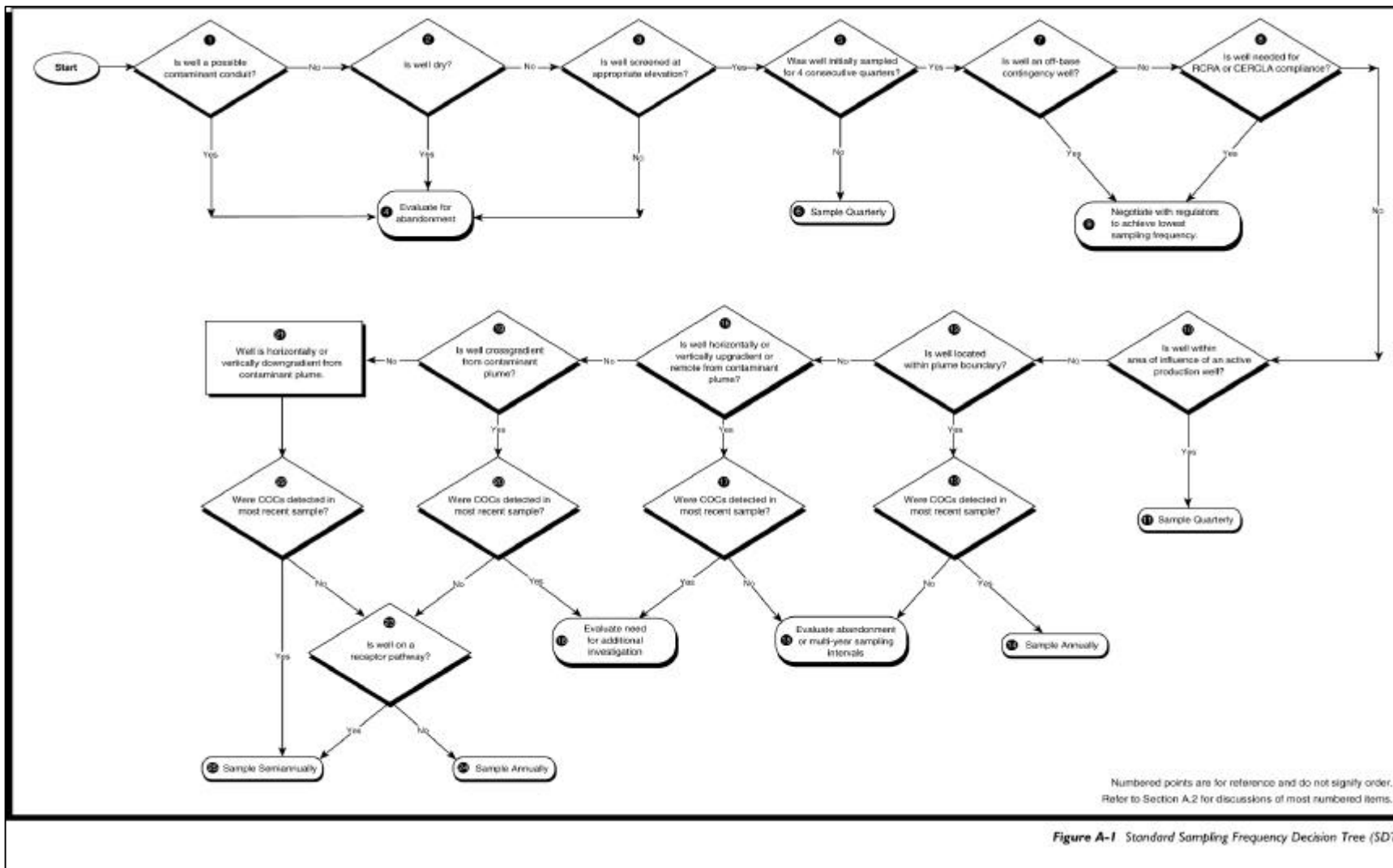


Figure A-1 Standard Sampling Frequency Decision Tree (SDT)

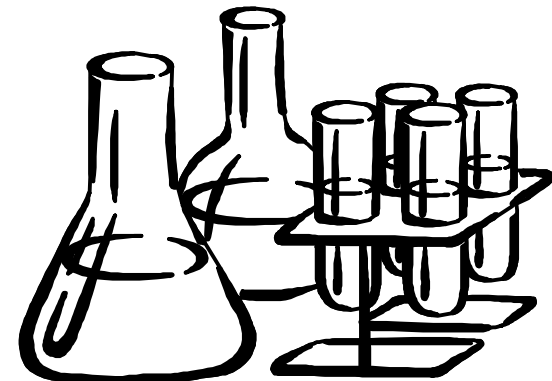
Determining Sampling Frequency

- **Time series analysis – “MAROS”**
 - **Trend analysis using smoothing techniques**
 - **Threshold analysis (infringement on MCLs or ARARs)**
- **Lawrence Livermore National Laboratory (LLNL) algorithm**
 - **“Cost-Effective Sampling”**



Effective Monitoring Parameters

- **Select parameters that effectively and efficiently monitor the Remedial Action Operation and contaminant transport**





Effective Monitoring Parameters (Continued)

- **Limit the analyses to**
 - **Present Chemicals-of-Concern (COCs)**
(Note: these may change over time)
 - **Regulatory required parameters**
 - **Parameters necessary to demonstrate natural attenuation or other remediation**



Effective Monitoring Parameters (Concluded)

- **Seek regulatory approval to delete an analysis if**
 - **The analyte has never been used at the site or detected in the groundwater**
 - **Historical data shows the analyte is consistently below regulatory levels (e.g., < MCLs)**



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■ **Guidance & Tools**

- **Remedial Process Optimization Handbook (AFCEE)**
- **RPO Field Procedures and Quality Assurance Handbook (AFCEE)**
- **Monitoring and Remediation Optimization System (MAROS) software (AFCEE)**
- **Technology Review Checklists (USACE)**

<http://www.afcee.brooks.af.mil>

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